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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]It is related with the manufacturing method of flexible polyurethane foam,
and its device.
[0002]
[Description of the Prior Art]It sprinkles traversing in in the paper it was processed with the
synthetic resin which stirred the polyurethane foaming stock solution with the agitator in
continuation foaming of flexible polyurethane foam, and was covered on the endless conveyer
(right-and-left crossing), When the side plate for foaming and the side plate for foaming for
movement of another side which stand straight to an endless conveyer, have a very small
crevice, and were fixed were based on the foaming width possessing a foaming starting
position widening device, they were narrowly set up 15 centimeters from 8 centimeters in the
place possessing a foaming shape maintenance widening device. When foaming width was
widened, the reason carried out in this way has a risk of the paper or the film which covers the
side of flexible polyurethane foam slipping down from form, and was compulsorily suppressed
by the roller part for heating following the side plate for foaming for movement, and this.
[0003]
[Problem(s) to be Solved by the Invention]When it was going to widen foaming width, the side
plate for foaming and the roller part for heating by the side of movement were widened until it
became prescribed width intermittently about constant width all at once. As a result, in 100-cm
width, foaming width has 8 to 15% of loss, and becomes 4 to 7.5% of loss also by 200-cm
width. When averaging, it had become 6 to 11% of loss. In order to press down compulsorily
besides economic loss, the balance of gasification and a resinifying reaction collapsed, the
scorching (reddish-brownish phenomenon) state occurred inside form at inferior goods and
summer of exploding from the middle of form (top blow), and the fault of degradation of a

product and yield aggravation of a product had occurred. Although it is mainly a problem in the same lot number (the same combination), in order to lessen front ** and after ****** in recent years, the case where foaming height is specified also by the same lot number according to a request of the method and customer who switch a lot number and foam continuously has increased extension. Although the relation between the foaming height in this case, conveyor speed, and an injection rate has been done experientially, automatic control is carried out, and if easy, it is necessary to close continuation foaming.

[0004]

[Means for Solving the Problem]This invention is reached as a result of inquiring wholeheartedly, in order to solve an aforementioned problem. Namely, carry out the connecting lock of a side plate for foaming, and two or more rollers for heating to an endless conveyer in the upper part and the lower part right-angled by a noncontact state, respectively, and each roller makes it pivotable, it ****** and is parallel and a roller part for heating, and nothing this a roller part for heating are uprighted, Carry out construction supply of the paper resinated on an endless conveyer continuously, and it is made to contact 15-25 centimeters towards an upper bed from a lower end of a side plate for foaming, Move side paper or a side film according to height of flexible polyurethane foam in the state where it stood straight, between papers which touch towards an upper bed from a lower end of a side plate for foaming, and this side plate for foaming on the other hand, and it rolls round behind a trailer of a roller part for heating of an endless conveyer corresponding to conveyor speed, In a method of carrying out pouring spraying, carrying out foam curing of the foaming stock solution for flexible polyurethane foam on an endless conveyer on a synthetic resin converted paper which carries out construction supply continuously, and manufacturing flexible polyurethane foam continuously, A side plate for foaming and a roller part for heating which ****** solved a technical problem with a manufacturing method and a device of flexible polyurethane foam having made it a fixed side and the movement side be parallel. Namely, a thing for which foaming shape maintenance (end) is pressed down 15 cm from 8 cm compared with a foaming starting position (tip) of a side plate for foaming when foaming to flexible polyurethane foam continuously, In view of a position of a competitive reaction of a resinifying reaction and a GASURO-ized reaction, two reactions will be pressed and a top blow and a scorching phenomenon of summer will be accelerated. In order to prevent a top blow and scorching, a side plate for foaming of a fixed side and the movement side is parallel, and it is desirable for foaming width to be the same. Merely In this case. When widening and a side plate for foaming by the side of movement and a heating roller part by the side of interlocking movement are extended at once, to a foaming shape holding portion of an end of a side plate for foaming between flexible-polyurethane-foam flanks. A phenomenon in which a film or paper which a crevice occurs and ** a flank of flexible polyurethane foam with covering slips down from a

flank of flexible polyurethane foam happens. In order to prevent this downward slip, it extends first with a foaming starting position widening device of a side plate for foaming when widening foaming width of flexible polyurethane foam, and subsequently a foaming shape maintenance widening device is opened, a tip widening device of a roller part for heating by the side of movement is opened continuously, and, subsequently an end widening device is opened. Extension is made to complete repeatedly intermittently until it becomes predetermined foaming width with constant speed about constant width. The widening methods include a two step method, triplexing, and a four-step method. As a two step method, when widening foaming width, they are constant width **** and the method of widening until it becomes prescribed width intermittently about a roller part for heating by the side of constant width **** and occasion movement in a side plate for foaming by the side of movement of constant width. As triplexing, when widening foaming width, a part (foaming starting position widening device) of a foaming starting position of a side plate for foaming by the side of movement of constant width is extended with constant speed, Subsequently, a method of opening a side plate for foaming of foaming shape maintenance (foaming shape maintenance widening device) by the side of movement with constant speed, and subsequently expanding constant width of a roller for heating by the side of movement with constant speed, When widening foaming width, constant width of a tip widening device of a heating roller part by the side of movement is expanded with constant speed immediately after carrying out constant width extension of the side plate for foaming by the side of movement, subsequently constant width of an end widening device of a heating roller part by the side of movement is expanded with constant speed, and there is a method of widening until it becomes prescribed width intermittently. As a four-step method, when widening foaming width of flexible polyurethane foam, Widen constant width of a foaming starting position widening device of a side plate for foaming by the side of movement with constant speed, and constant width of a foaming shape maintenance widening device of a side plate for foaming by the side of the movement same subsequently is widened with constant speed, Subsequently, constant width of a tip widening device of a heating roller part by the side of movement is expanded with constant speed, constant width of an end widening device of a heating roller part by the side of the movement same subsequently is expanded with constant speed, and there is a method of widening with the same operation method until it becomes prescribed width intermittently. Extension of foaming width by a two step method, triplexing, and a four-step method sees a state of slipping down of paper which accompanies the side of flexible polyurethane foam by a lot number, or a film, and is ******. A two step method > triplexing > four-step method is used for turn which slipping down cannot carry out easily. Carrying out a deer. Slipping down from a flank of a film or paper which ** a flank of flexible polyurethane foam with covering by a roller part for heating by the side of movement depending on a combination lot number as a side plate for foaming and a roller part

for heating by the side of a side plate for foaming of a fixed side, a roller part for heating, and movement are parallel and foaming width is the same may take place. A method of putting in beforehand a roller part for heating by the side of movement inside (foaming width is narrowed) 5-30 mm, for preventing this is preferred. Contraction of flexible polyurethane foam is about 1.5%. By 2000-mm width, it is 15 mm in 30 mm and 1000-mm width. About relation between foaming height of a continuous production method of flexible polyurethane foam, conveyor speed, and an injection rate. When foaming to the same, same lot number of a combination formula and making foaming height high from H (1+K) to -H, When adjusting conveyor speed V_K of an endless conveyer to -(1+K) V**10% and making foaming height high further at -H from H (1+K), it is about injection-rate P**K**. -(1+K) (1+K)- It solved by adjusting to P**20%.

[0005]In extension of foaming width, if an injection rate of a polyurethane foaming stock solution is fixed, foaming height will become low and foaming yield will worsen. It is necessary to increase an injection rate according to foaming width. Supposing a section of flexible polyurethane foam is a rectangle, it is VxHxWxd=e-P (1-GL).

An expression of relations to say is materialized.

V: Conveyor speed (cm/min)

H: Foaming height (cm)

W: Foaming width (cm)

d: apparent density of form g/cm^{3}e: -- coefficient P: by a lot number -- injection rate (g/min)

GL: A gas loss by a lot number (water, gas fly off coefficient of a foaming auxiliary)

If V, H, d, e, and GL are temporarily set constant now, it will become C-W**eP (V-H-d=C), and foaming width and an injection rate will become a relation of direct proportion mostly.

[0006]Relation between firing height H and conveyor speed is described here. It is a model sectional view showing relation between the foaming standup foaming angle theta of a flexible polyurethane foaming stock solution, and foaming height H in drawing 9. When a place where agitated liquid of a flexible polyurethane undiluted solution took down an altitude from a place set to maximum height H from creamy voice to an endless conveyer, and a place on an endless conveyer to a cream standup are set to L, relation between foaming rise angle theta and the foaming height H and L is tan theta=H/L. If L_1 when foaming height is increased 1.5 times like drawing 10 now is calculated, and foaming rise angle theta is set constant, it will become tantheta=1.5 H/L_1=H/L, and will be set to 1.5 H-L=H-L_1 -> L_1=1.5L, and L_1 will be 1.5 times the L. If L corresponds to the conveyor speed V and one 1.5 times the foaming height of this will be used now, conveyor speed will increase 1.5 times.

[0007]If L_K when foaming height is doubled now (1+K) is calculated, and foaming rise angle

theta is set constant, it will become tantheta=(1+K) H/L_K=H/L and will be set to L_K=(1+K) -L.

Although conveyor speed is set to -(1+K) L (1+K) and it doubles, conveyor speed is adjusted to predetermined height by -10% to +10% of fine adjustment. About a relation with injection-rate P_1 for increasing foaming height H 1.5 times, if the foaming width W, the apparent density d of form, the coefficient e by a lot number, and the gas loss GL by a lot number are set constant, let C be a constant coefficient.

By a 1.5Vx1.5 H**C-P <- V-H**C-P2.25 VH**C-P_1 reason It will be 2.25 times the injection rate P at the time of P_1=2.25P foaming height H.

[0008]About a relation with charge of pouring P_K for doubling foaming height H (1+K). (1+K) It becomes -Vx (1+K) and H**C-P (1+K). -(1+K)- V-H**C-P_K, therefore P_K= (1+K) -(1+K)- It becomes twice [- (1+K) (1+K)] the injection rate P at the time of P foaming height H. So, as for a minimum, in injection-rate P_K, x(1-0.1) (1-0.1) =0.81 maximum becomes x(1+0.1) (1+0.1) =1.21, and **20% of fine adjustment of a predetermined injection rate is needed.

[0009]Combination, apparent density, and a relation of a gas loss are shown in Table 1.
[Table 1]

配合名	A	B	C	D	E	F	G
ポリオール	100	100	100	100	100	100	100
ＴＤＩ	37.72	42.56	47.00	52.24	57.08	61.92	66.76
水	3.0	3.5	4.0	4.5	5.0	5.5	6.0
見掛密度 g／cm³	0.034	0.031	0.028	0.025	0.023	0.022	0.021
ガスロス ％	5.21	5.86	6.48	7.02	7.54	8.03	8.49

Polyol was calculated except for the slab form service-water acid radical value 56, a foam stabilizer, and an amine catalyst. A TDI index is 100.
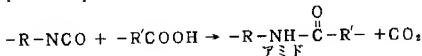
[0010]Although apparent density and a gas loss of urethane foam are not reliable other than an actual measurement, a simple method is described below.

Calculation of apparent density in free foaming :. Example of combination A{100+37.72-3.0x. (44-18) / 18}/[100+{37.72-3.0x. (44-18) / 18}/1.22+22400x(3.0/18)]=0.034 notes: -- 1.22 -- example of calculation:combination A{3.0x(44/18)/(100+37.72+3.0)} x100=5.21 of specific gravity of TDI, the CO_2:molecular weight 44, and a water:molecular weight 18 gas loss [0011]
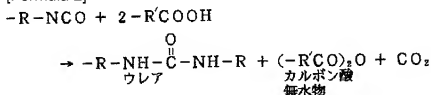
Apparent density in the above-mentioned free foaming and a formula of a gas loss are used for combination determination as a rule of thumb. Although a TDI index was calculated as 100, in the case of soft polyurethane slab foam, 102 to 135 and TDI are superfluous, and it is

produced. So, apparent density of actual urethane foam becomes small 10 to 20%. Thinking as a cause can consider carbon dioxide generating [carry out fly off by a gas by very small moisture which exists in polyol, fire retardant, or paints, a liquefied amine catalyst, and inside generation of heat of form of superfluous TDI, and also] by a reaction with polyol of TDI, and a low molecule substance in a bulking agent. Conversely, a gas loss becomes large only the part.
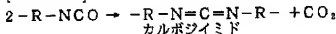
[Formula 1]

$$-R-NCO \ + \ -R'COOH \ \rightarrow \ -R-NH-\overset{\overset{O}{\|}}{C}-R'- \ +CO_2$$
アミド

[Formula 2]

$$-R-NCO \ + \ 2-R'COOH$$

$$\rightarrow \ -R-NH-\overset{\overset{O}{\|}}{C}-NH-R \ + \ (-R'CO)_2O \ + \ CO_2$$
ウレア　　　　カルボン酸
無水物

[Formula 3]

$$2-R-NCO \ \rightarrow \ -R-N=C=N-R- \ +CO_2$$
カルボジイミド

[0012]This invention is explained based on a drawing. Drawing 1 is a perspective view showing the outline of the device of this invention. An endless conveyer progresses to the left from the right. It is sprinkled carrying out stirring mixing of the polyurethane foaming stock solution with the agitator 10 on the bottom paper (not shown) which carries out construction installation on a conveyor, and traversing as a bottom paper as the infusion 11. It slips down and progresses with the blowing pressure of polyurethane foam by the side plate for foaming (fixed side 2 side and movement side 3), and the roller part for heating (fixed side 4 side and movement side 5), and the side paper or the film (not shown) which covers the side of urethane foam is rolled round in the place which came out of the endless conveyer. A bottom paper is also rolled round in the place which came out of the endless conveyer. The side plate for foaming of the fixed side is being fixed with the back up plate (not shown) which stood straight in the very small crevice to the end face of the endless conveyer, and stood straight from the floor line by the length of 10 to 20 rice. Similarly the heating roller part 5 of a fixed side installs a roller in a 40-centimeter interval from 30 centimeters by the length of 10 to 20 rice, Fixing the upper part and the lower part so that it may be united, rotation of each roller is attained and it **** without resistance the film or paper which carried out covering adhesion of the flank of flexible polyurethane foam. The lower part of the roller part for heating is being fixed with the back up plate (not shown) which stood straight in the very small crevice to the

end face of the endless conveyer, and stood straight from the floor line. Each roller which constitutes a heating roller part is sent out to a direction of movement in the state where it pressed lightly, contacting the film or paper in contact with the side of flexible polyurethane foam. The side plate for foaming by the side of movement stands straight in a crevice with a very small endless conveyer, The back up plate (not shown) upright from the floor line is a movable means (width.). the threaded rod which can be specified, the iron bar which has an uneven fitting part fixable for every centimeter, and others -- the foaming starting position widening device 6 and the foaming shape maintenance widening device 7 -- moreover -- the upper part and lower ****** -- it is being fixed in the movable state at four places that it is few. The heating roller part by the side of movement as well as a fixed side is installed. The device as the side plate for foaming by the side of movement with same tip widening device 8 and end widening device 9 is installed. Even when the foaming starting position widening device of this side plate for foaming and a foaming shape maintenance widening device are independent, the linkage also operates. The tip widening device and end widening device of the roller part for heating are also independent, or operate by linkage. The side plate for foaming and heating roller part by the side of movement operate independently. (With the conventional device, the foaming starting position widening device 6 and the foaming shape maintenance widening device 7 carry out identical width extension of the extension simultaneously by linkage.) The tip widening device and end widening device of a heating roller part by the side of movement also carry out identical width extension simultaneously by linkage.

[0013]Drawing 2 is a sectional view showing a foaming state of flexible polyurethane foam of this invention. The discharged liquid 11 which stirring mixing of the polyurethane foaming stock solution was carried out with the agitator 10, was traversed, and was sprinkled becomes certain height (H) from 40 seconds in 50 seconds through creamy voice to the gel state.

[0014]Drawing 3 is a B-B sectional view of drawing 2. Foaming height H and the foaming width W are expressed.

[0015]Drawing 4 is a top view showing a position of the side plate 2 for foaming of the conventional fixed side, the roller part 4 for heating, and the side plate 3 for foaming by the side of movement, Foaming width of a position of the foaming starting position widening device 6 of a side plate for foaming shows that only y of a side plate for foaming of a fixed side is larger on the outside of foaming than on the foaming width W of a position of the foaming shape maintenance widening device 7 of a side plate for foaming by W+y. That is, pressing only y progressively in a place of a foaming shape maintenance side plate is shown.

[0016]Foaming starting position ****** 6 of drawing 5 of a side plate for foaming by the side of movement is the top view in which only w was widened.

[0017]Drawing 6 is a top view showing the state where the side plate 3 for foaming by the side of movement widened only w. The 1st step of two step method extension is shown. (The side

plate 3 for foaming by the side of movement of triplexing and a four-step method also contains a top view showing the state where only w was widened)

[0018]As for drawing 7, a side plate for foaming by the side of movement and the tip widening device 8 of a roller part for heating by the side of movement are the top views in which only w was widened.

[0019]Drawing 8 is a top view showing that only b (5-30 mm) put in a roller part for heating inside (only b narrows foaming width) for prevention from slipping down of a film which covers a flank of flexible polyurethane foam and ****, or paper.

[0020]Drawing 11 is a schematic diagram for explaining apparatus which measures foaming height of flexible polyurethane foam by a non-contact method. (A laser displacement gage by OMRON Corp., form 324 M-J) As a principle, a beam emitted from a semiconductor laser passes along a floodlight lens, and makes a spot on a measurement object. Light which carried out scattered reflection from this spot lets a condenser pass, and connects an image to one on a position detecting element. If a position of a measurement object changes to a direction (A**), a position of an image on an element will change to a direction (B<-). This variation is changed into an electrical signal by a position detecting element, and by a controller part, operation amendment is performed and it outputs as variation of a measurement object. Are during foaming of flexible polyurethane foam and the sensor itself takes up and down during an infestation traverse according to an up-and-down wave on the upper surface of a robe (long direction bodily-shape polyurethane foam), If height of a sensor is held by an up-and-down mechanism in a detection range scale which itself has, since height of a sensor is mostly shown from the conveyor upper surface at that time, a pulse number which an up-and-down mechanism rotary encoder shows will serve as foaming height of a polyurethane robe. Since foaming height is recorded on this account recording form of self-, it is known. Height of a urethane robe makes the lowest place foaming height. (It is because a product is taken out from the lowest place when it ****)

[0021]

[Function]It is attached to a foaming operator control panel, and is equipped with the extension numerical control unit. As for the widening device, the foaming starting position widening device, the foaming shape maintenance widening device, tip widening device, and end widening device by the side of movement are being interlocked with the numerical control unit by the screw type. The discharge flow amount of the polyurethane foaming stock solution accompanying extension enables it to have increased in proportion [almost] to foaming width, and it enables it to have measured foaming height with the laser displacement gage (made by OMRON Corp.) with a measuring point. It is the regurgitation by responding to foaming height. Quantity is tuned finely.

[0022]From side plate 15 rice for foaming, and roller part 15 rice for heating, the roller part for

heating is made narrow to the 2-centimeter inside, and foaming 200 centimeters in width are widened 220 centimeters. The program for conveyor speed 4 U.S./is illustrated for rise time 100 seconds by 100l. of polyurethane foaming stock solution discharge quantity/.

[Table 2]

拡幅 セメチメートル	発泡開始位置加幅装置 秒	発泡形状保持用加幅装置 秒	先端加幅装置 秒	未端加幅装置 秒	吐出量 1/分
204	0	15	75	90	101
206	15	30	90	105	102
208	30	45	105	120	103
210	45	60	120	135	104
212	60	75	135	150	105
214	75	90	150	165	106
216	90	105	165	180	107
218	105	120	180	195	108
220	120	135	195	210	109
222	135	150	210	225	110

[0023]

[Effect of the Invention]It foamed to the foaming starting position widening device of the side plate for foaming by the side of movement of a place with a foaming width of 200 centimeters

at 210 centimeters. The thing of 60 rice was extended to 230 centimeters on the way in long form, and discharge quantity was not changed. One 210 centimeter x60 rice and one 230 centimeter x60 rice foamed. On the other hand, the side plate for foaming and the roller part for heating a fixed side and by the side of movement were made parallel by this invention, it widened by time difference by having made the heating roller part by the side of movement narrow to the 2-cm inside, and discharge quantity was performed in proportion to foaming width. One 202 centimeter x60 rice and one 222 centimeter x60 rice foamed. (It expressed as the index)

Effect by parallel Effect by the increase in discharge quantity Synergistic effect conventional example 100 100 100 this invention 104 110 Yield of this invention improved 14% from the 114 former.

[Translation done.]